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Presentation to the NASA Workshop  
on the Suborbital Science  
Sounding Rocket Program

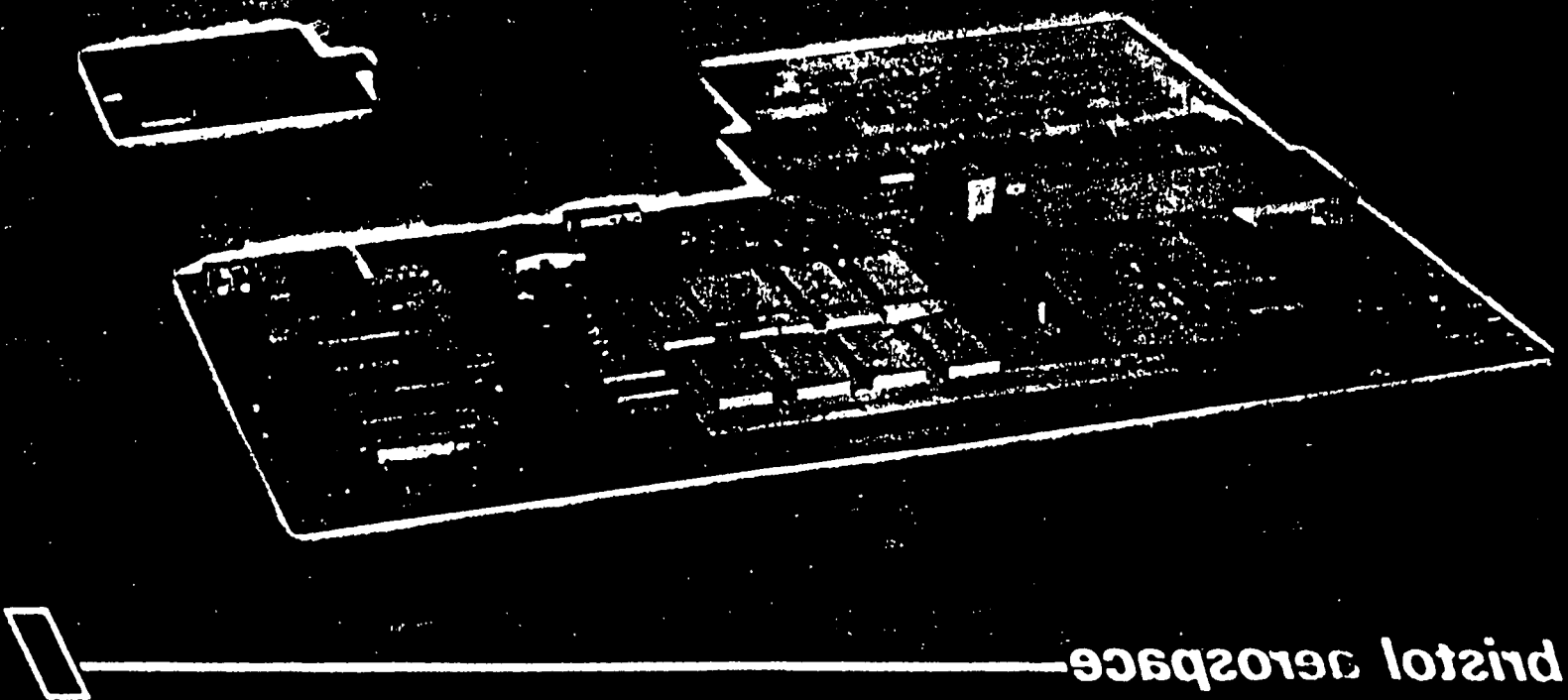
November 12, 1991

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## **Bristol Today**

- **1,650 employees**
- **\$150 million in annual sales**
- **700,000 square feet of plant space**
- **Propellant plant and test facility on 4,000 acres**
- **Over 10 million lb of composite propellant processed**



pistol aerospace

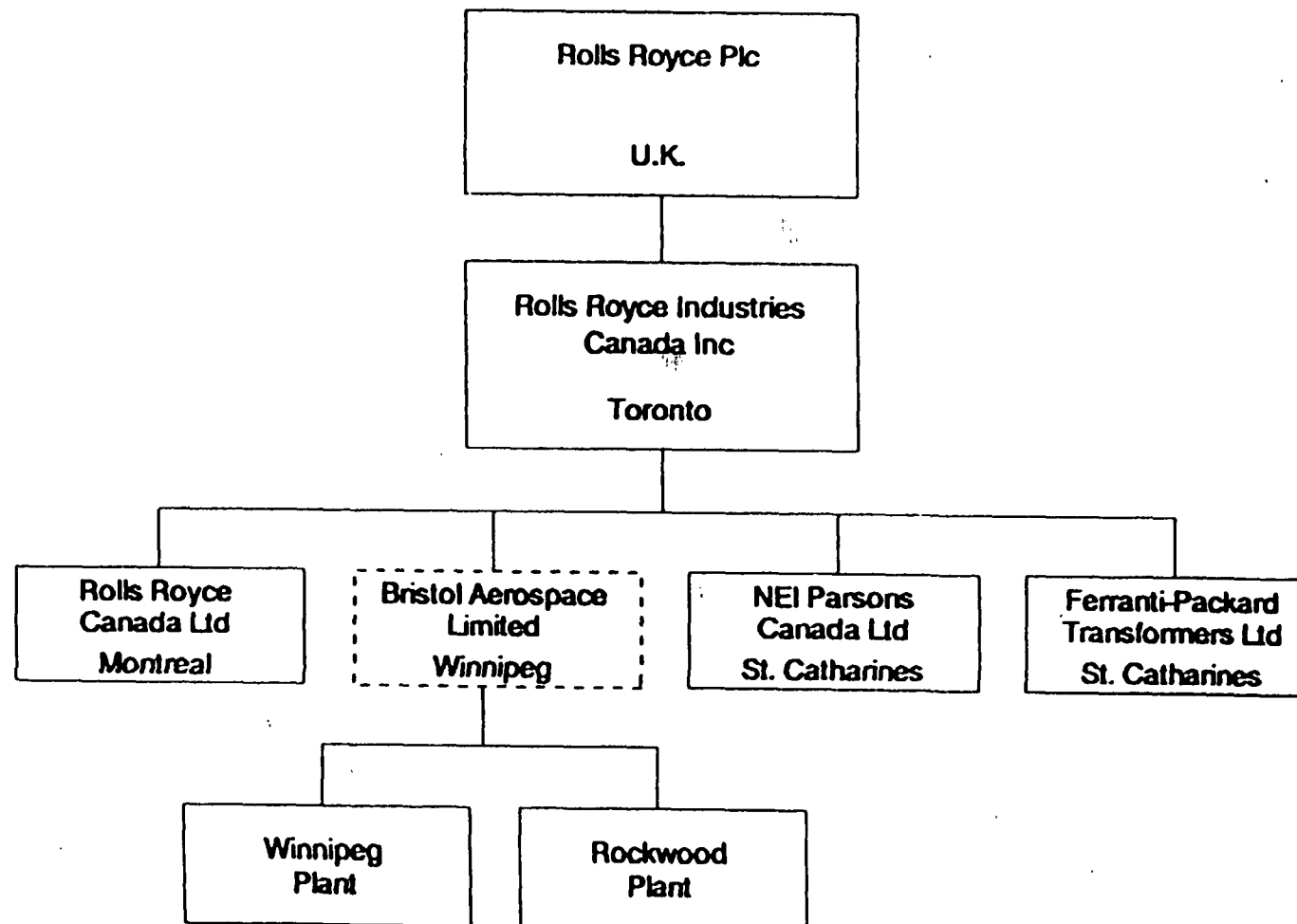
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## Corporate Organization

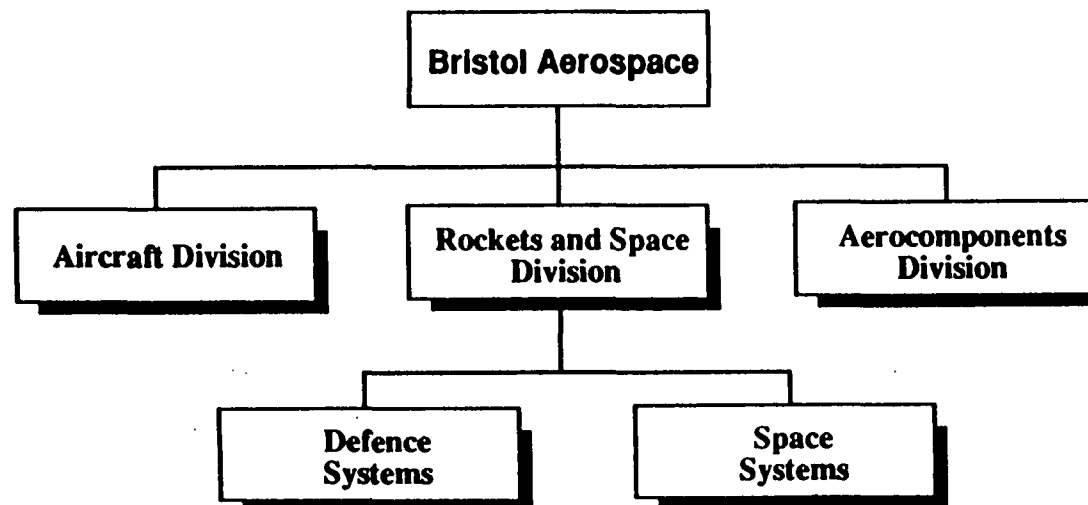


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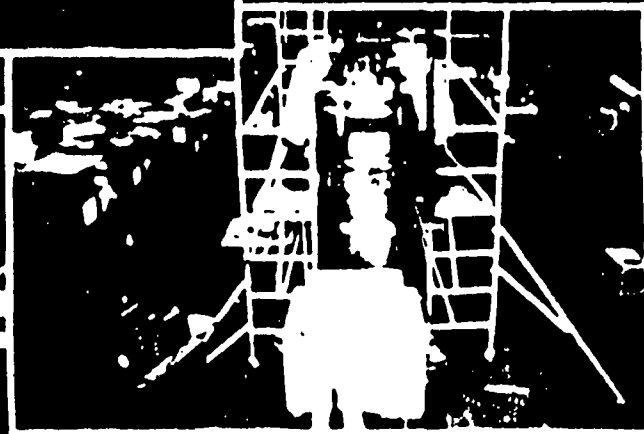
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## Product Groups



# R&O



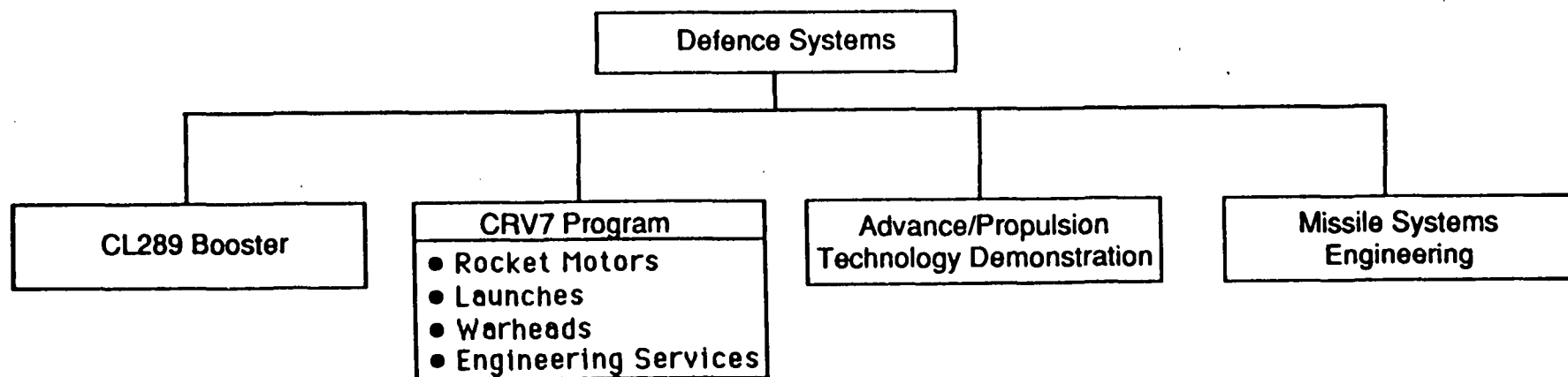
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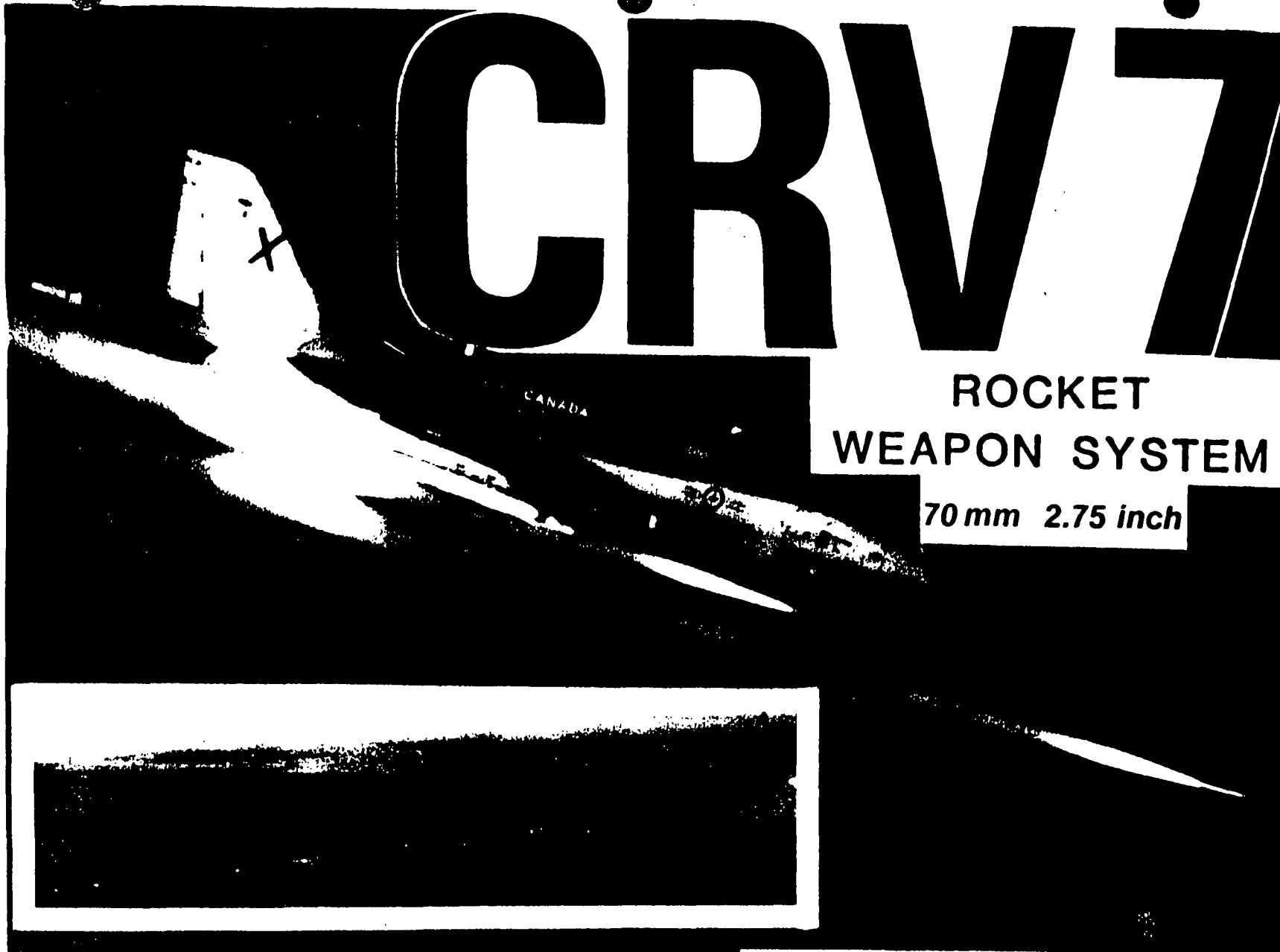




# CRV7

ROCKET  
WEAPON SYSTEM

70 mm 2.75 inch



bristol aerospace limited 

# ILFORD CIBACOPY™ OVERHEAD TRANSPARENCY

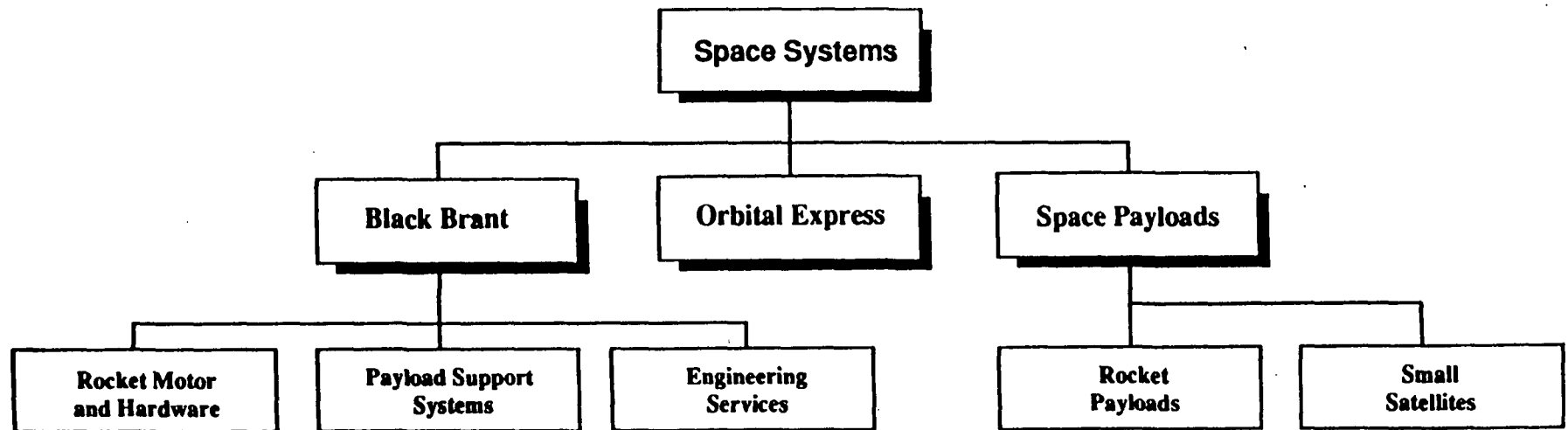


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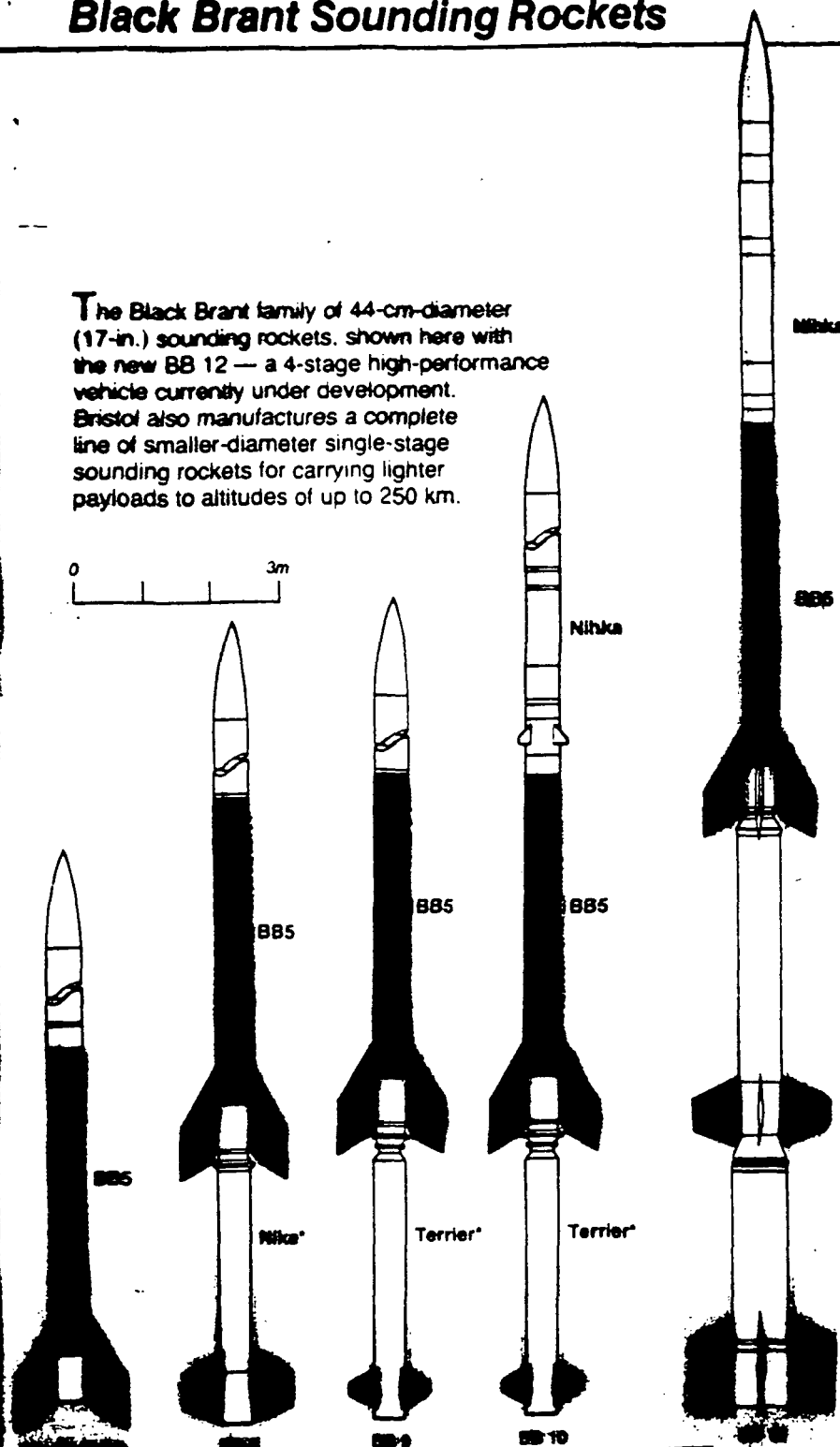
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## Black Brant Sounding Rockets

The Black Brant family of 44-cm-diameter (17-in.) sounding rockets, shown here with the new BB 12 — a 4-stage high-performance vehicle currently under development. Bristol also manufactures a complete line of smaller-diameter single-stage sounding rockets for carrying lighter payloads to altitudes of up to 250 km.

0 3m





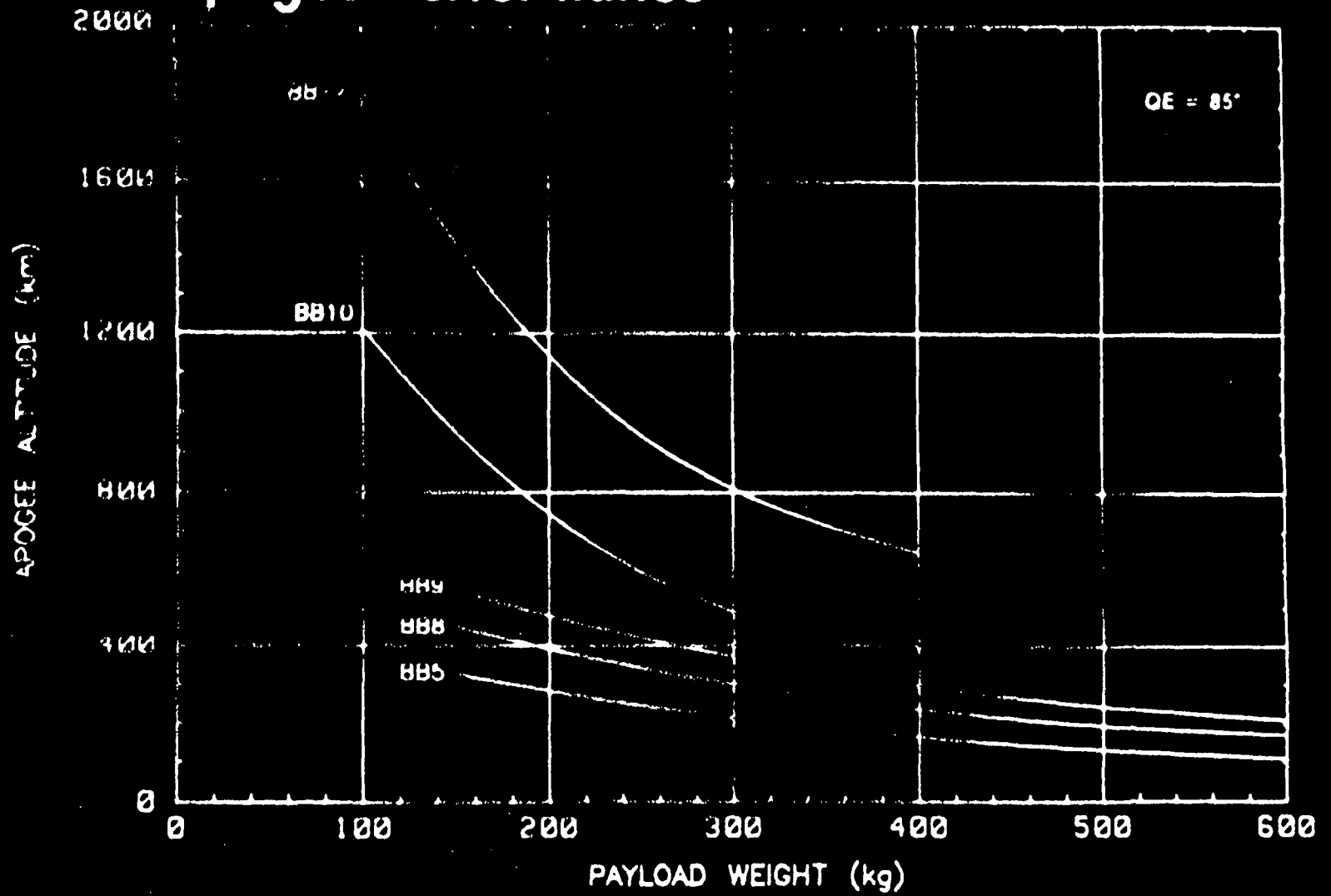
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Support Systems  
Sustains Moderns



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# Apogee Performance



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## **Black Brant Chronology**

<b>1960</b>	<b>BB3, BB4 and BB5 development started</b>
<b>1962</b>	<b>First launch of a Black Brant</b>
<b>1966</b>	<b>BB4 and BB5 operational</b>
<b>1976</b>	<b>BB8 operational</b>
<b>1981</b>	<b>BB10 operational</b>
<b>1982</b>	<b>BB9 operational</b>
<b>1989</b>	<b>BB11 and BB12 operational</b>

## **Black Brant Users**

**NASA**

**National Research Council of Canada**

**Air Force Geophysical Lab**

**Naval Research Lab**

**Defense Nuclear Agency**

**German Space Agency(DARA)**

**Swedish Space Corporation**

**Strategic Defense Initiative Organization**

**MBB/ERNO**

**EER(Space Services Division)**

**Aerospatiale**

**Matra Marconi Space**

**Operational Flights of Black Brant Vehicles (as of May 23,1991)**

	<b>BB5</b>	<b>BB8</b>	<b>BB9</b>	<b>BB10</b>	<b>BB11</b>	<b>BB12</b>	<b>Total</b>
<b>Flights</b>	<b>132</b>	<b>98</b>	<b>72</b>	<b>31</b>	<b>1</b>	<b>2</b>	<b>336</b>
<b>Reliability(%)</b>	<b>97.0</b>	<b>99.0</b>	<b>100</b>	<b>92.9</b>	<b>100</b>	<b>100</b>	<b>97.9</b>

**(Note:Including BB3 and BB4 there have been over 500 launches with a total reliability of greater than 98%)**

## **Space Payload Experience**

- **Over 120 instrumented payloads designed and integrated**
- **Accumulated experience of current staff of over 300 man years**
- **Over 180,000 lbs of payload into space (equivalent of 3 shuttle loads)**
- **Over \$2 million in small science satellite feasibility studies and concept designs.**



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## **The Orbital Express**

- **A new vehicle for launching micro and small satellites.**
- **Payload capacity of 200lb to 400nm circular polar orbit.**
- **Industry team of International Microspace, Bristol Aerospace, Thiokol Corporation and Saab Space**
- **First launch planned for second half of 1993.**
- **Privately financed.**
- **Complete launch service price of \$4.5million.**

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## **Program and Procurement Requirements**

- **Bristol is a provider of vehicle hardware and engineering services, and does not intend to offer launch services.**
- **Bristol is a supplier of goods and services to both NASA and DOD, and has found the procurement process to be acceptable.**
- **For commercially manufactured hardware, multiple procurements are better for the OSSA than single because:**
  - 1. Manufacturing lead times are 18 months.**
  - 2. Significant cost efficiencies are achieved through larger batch sizes, reduced set-up times, and economic order quantities for materials.**
  - 3. Contracting overhead costs are minimized.**
  - 4. Multiple procurements allow plant load and workforce stability, hence better cost estimates and process control.**

## **Program and Procurement Requirements(cont'd)**

- **Supplier selection should continue to be based upon product capability and reliability, price competitiveness, quality and performance against contract requirements.**
- **In over 20 years of supporting the NASA Sounding Rocket Program, Bristol Aerospace has:**
  - 1. Met or exceeded all quality requirements, and supplied NASA with a very reliable rocket.**
  - 2. Never jeopardized a NASA launch schedule.**
  - 3. Provided cost effective hardware and services.**
  - 4. Invested company funds in R and D and value engineering.**
  - 5. Stayed in production during the "lean years".**